

en.
am

m.
m.

Canadian Pacific
Railway Company.

CANADIAN PACIFIC RAILWAY.

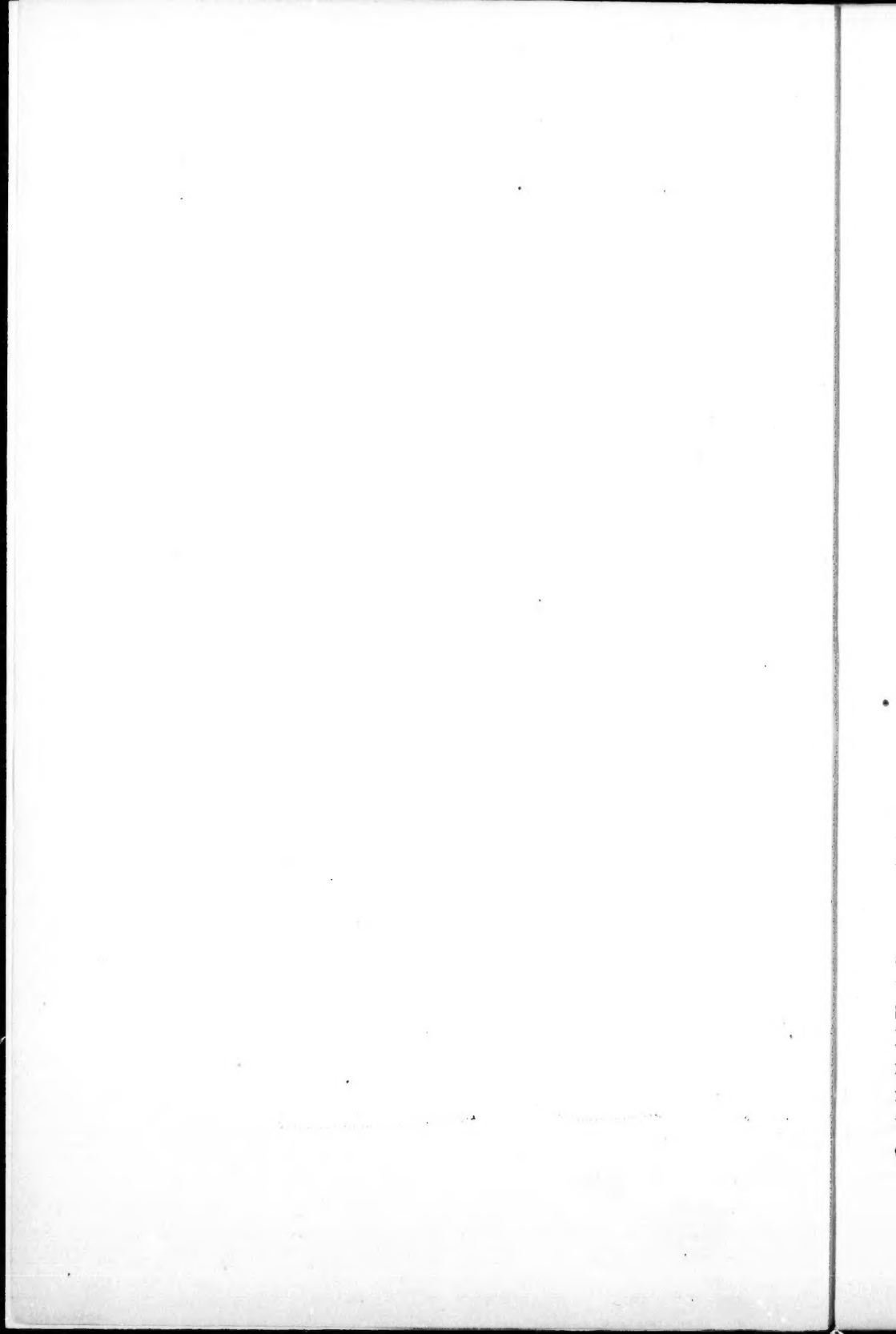
MONTREAL, 17th Sept., 1884.

The within Reports relating to the work remaining to be done by the Company, and to the character of the country on the western section of the line, are considered by the Directors of sufficient interest to warrant their publication and distribution among the Shareholders.

By order of the Board.

CHARLES DRINKWATER,
Secretary.

1884



THE CANADIAN PACIFIC RAILWAY.

To the Directors :—

I returned last month from Victoria, British Columbia, over the line of the Canadian Pacific Railway, and had an opportunity to examine every part of the work remaining to be done by the Company on the mountain section.

Wishing to give all the time possible to our own work, I did not examine in detail the Government work between Port Moody and Savonas Ferry, and as to this, I can only report that it is proceeding rapidly, the track having reached, at the time of my visit, a point near Spence's Bridge, about 160 miles from Port Moody, and the grading from there being so far advanced as to justify the belief that the track will be laid to Savonas Ferry before many weeks.

The completion of the track to Savonas Ferry will be of the greatest advantage to the Company's work, which commences at that point and is directly accessible from there by steamboats, on the South Thompson River and the Shuswap Lakes, for a distance of one hundred and eight miles.

Mr. S. B. Reed, an engineer of many years' experience, and under whose supervision the Union Pacific Railroad was built, accompanied me across the mountains, from Savonas Ferry; and as I am able to submit his report herewith, I need not speak in detail of the engineering features of the line. Mr. Reed's large experience in railroad location and construction, both in the mountain and the prairie sections of the West, makes his report especially valuable. From personal observation, I can vouch

for the accuracy of his statements, and I am confident that the cost of the work remaining to be done will fall considerably below his estimates, which were intended to be entirely safe. Indeed, the greater part of the work for more than one hundred miles eastward from Savonas Ferry has been let at prices below those upon which his estimates were based, and the cost of the large amount of work already done westward from the summit of the Rocky Mountains is also within his figures.

From the favorable character of the work and the progress already made, I think there will be no difficulty in completing the mountain section within a year from this date, and for four million dollars less than the estimates of last winter. Within the same time the eastern section will also be completed, so that by September next a through rail connection between Montreal and the Pacific Coast will be established. There are no difficult engineering problems to be met; the work is simple, and the cost easily calculated.

I am happy to state, as one result of my trip, that my doubts about the value of the mountain section of the railway have been entirely removed. In addition to the agricultural possibilities of the many valleys of British Columbia and its great mineral wealth, its magnificent forests alone will furnish a large and remunerative traffic for the railway. From the mouth of the Kicking Horse River, forty-four miles west from the summit of the Rocky Mountains, to the Salmon Arm of the Shuswap Lakes, a distance of one hundred and fifty miles, the line passes through a continuous belt of gigantic trees, which increase in size going westward until they reach their maximum in Eagle Pass, where trees eight and even nine feet in diameter, measured seven feet above the ground, are common. The timber is mostly cedar, Douglas fir, hemlock, white pine, spruce and tamarac. Other varie-

ties of more or less value also occur. All of the valleys near the line of the railway through the Gold Range and the Selkirk Mountains seem to be filled with valuable timber, and I have no doubt that the supply is practically inexhaustible. About the Pacific terminus there are also great forests of gigantic trees, even larger than those described, and the export trade in timber is already of considerable magnitude. There are many other sources of traffic and of wealth, the chief among them being the coals and the fisheries. The coals are the most valuable on the Pacific Coast, and are largely mined for shipment to San Francisco and elsewhere. The richness of the fisheries is almost beyond belief.

The magnificent harbours of British Columbia, its exceptionally favorable situation for commanding the trade of the North Pacific Coast, and of Japan and China, its abundant natural resources and matchless climate, must surely bring a large and rapid increase in wealth and population immediately upon the completion of the railway.

Having now seen all of the line between Winnipeg and the Pacific, and having studied the prairie section with great care, I feel justified in expressing my opinion in the strongest terms, that no mistake was made by the Company in adopting the more direct and southerly route instead of that by way of the Yellow Head Pass. The land along the northern route is undoubtedly good, but that along the constructed line is as good as land can well be, and the worst of it would be rated as first-class in almost any other country. Reports about alkali districts and sandy stretches have been circulated by parties ignorant of the country. These reports have in some cases originated in malice, and in others from superficial observation. There is no more alkali in the land on the prairie section of the line, than on any other prairie section of the same extent in North America. There is no more of it in the

prairie soil along the line than is required for the perfect growth of cereals. There is not one mile of the country where good water cannot be obtained, and, as three years' experience leads me to believe, where there is not sufficient rain-fall for the growth of the crops. There is a notable absence of sand between Brandon and the mountains. It occurs in very few places, and it so happens that nearly all of the sandy spots have been taken up by settlers. The yellow clay subsoil, so common west of Moosejaw, has doubtless been frequently mistaken for sand by parties looking at it from passing trains.

I do not hesitate to say that the Canadian Pacific Railway has more good agricultural land, more coal and more timber between Winnipeg and the Pacific coast than all of the other Pacific railways combined, and that every part of the line, from Montreal to the Pacific, *will pay*.

Since writing the above, I have received the following telegram from Mr. Collingwood Schreiber, Chief Engineer of Government Railways, who has just made a trip over the mountain section of the line:—

“COLUMBIA, B.C., Sept 15th.

“Reached here this afternoon. Most satisfactory trip through the mountains. Should have been very much astonished at the character of the work, had you not previously given me a description of it.”

I have the honor to be,

Gentlemen,

Respectfully yours,

W. C. VAN HORNE,

Vice-President.

Montreal, September 16th, 1884.

JOLIETE (Illinois), Sept. 9th, 1884.

SIR,—

Upon your request, and on receipt of your letter of instructions, dated Montreal, May 17th, 1884, to go to British Columbia and examine the location on the Kamloops section of the Canadian Pacific Railway, I proceeded at once, via San Francisco and Victoria, B. C., to Savonas' Ferry, at the West end of Kamloops Lake, where the Government contract for building east from the Pacific coast ends and the work of the Company commences.

At Savonas' Ferry I met Mr. Cambie, in charge of construction, and Major Rogers, in charge of location, who walked with me over the proposed line to Kamloops village, a distance of twenty-five miles. At this time (June 6th) Major Rogers had his locating parties organized and at work, and had located the line from Savonas' Ferry about ten miles to the vicinity of the Cherry Creek Bluffs, where the expensive rock work of the Kamloops section occurs. After carefully examining the proposed line, I telegraphed you my opinion that the low grade shore line, on the south side of Kamloops Lake, should be adopted in preference to all other lines on the south side, in which opinion Mr. Cambie and Major Rogers fully concurred.

In locating the line along the face of the Cherry Creek Bluffs, every foot of the distance was carefully examined, and the best possible location selected. The work on this part of the section (six miles) is expensive but cannot be avoided. The grades on the lake section are favourable, in no case exceeding one per cent., and are compensated for curvature.

During the location to Kamloops, I examined thoroughly the high grade line located by the Government Engineers, some years ago, along the Cherry Creek Bluffs, which I

think would be impracticable to build and maintain. Embankments more than fifty feet high occur, the slopes of which would extend into the lake, where, in sounding with a line one hundred and ten feet in length, no bottom was reached. Neither is there room to build retaining walls, or trestle bridging without extending into very deep water.

The rock excavation on the new line will be much less than on the old, and the tunnelling is reduced more than one-half. The maximum gradients are the same on the new line as on the old, but the curvature is increased—curves of ten degrees having been found necessary at the Cherry Creek Bluffs.

I also examined carefully a line run by Major Rogers over the hills south of the Bluffs, which would avoid a part of the heavy work, and cost less to build, but to construct this line, grades of one hundred and sixteen feet per mile cannot be avoided, and as there is no grade between the Selkirk Mountains and the Pacific coast, (about 390 miles) exceeding sixty-six feet per mile, it would not be sound railroad policy to introduce heavier grades near the centre of this long section, if they could be avoided without excessive expense.

I also thoroughly examined the country outside of the above specified lines, and was fully satisfied that the low grade shore line was the best that could be selected on or near the south shore of Kamloops Lake.

I submit herewith an estimate of the total quantities of earth and rock excavation and tunnelling based upon the prices at which I understand the work to be let, also of bridging, as estimated from the located line, with the estimated cost of ties, rails, fastenings, track-laying, ballasting, buildings, right of way and engineering, making the total estimated cost of this section of twenty-five miles,

one million one hundred thousand one hundred and forty-four dollars (\$1,100,144), or about \$44,006 per mile.

After the location of the above-described section was finally completed, I passed over the remaining portion of the mountain section of the Canadian Pacific Railway yet to be built from Kamloops Village, in British Columbia, to the end of track near the summit of the Rocky Mountains, a distance of 263 miles. Having seen the plans and profiles covering nearly all of the heaviest work, and having examined the character of the materials to be moved and the bridge to be built, I am able to speak of the cost of the line remaining for construction with reasonable accuracy.

From Kamloops Village to the Little Shuswap Lake, thirty-eight miles, the line runs near the shore of the South Thompson River, crossing the farms that are located in the valley, where the small streams tributary to the river furnish water for irrigation. The grading and bridging on this portion of the line is very light, and the material is mostly sand and gravel. The trees are few and scattered, and clearing and grubbing will be very light.

From Little Shuswap Lake to Sicamous Narrows (forty-five miles) the line will be somewhat more expensive. The Shuswap Lakes are of irregular shape, and their arms, extending out between the mountains, distort the railway line and cause a loss in distance of about eight miles. The line leaves the South Thompson River at the head of the Little Shuswap Lake, crosses a "divide" to the Salmon arm of the Shuswap Lakes, and passes around on the south shore to Sicamous Narrows.

From the west end of the Little Shuswap Lake, going eastward, the excavation on the first six miles will average nearly 30,000 cubic yards per mile, about one-half of which will be rock. On the next fourteen miles the work

will average 16,000 cubic yards per mile—all earth and gravel. The next thirteen miles will average 16,000 yards per mile, 1,000 yards of which will be rock and the rest earth, gravel and sand. The remaining twelve miles to Sicamous Narrows will average only about 10,000 cubic yards to the mile, 40 per cent. of which will be rock. On this section there will be two short tunnels—one of 240 feet and one of 300.

From Savonas' Ferry to Sicamous Narrows, a distance of 108 miles, the entire line is contiguous to navigable waters, and is therefore most favourably situated for cheap and rapid construction.

From Little Shuswap Lake eastward there is a marked change in the climate. Instead of the dry and almost rainless section extending eastward from the Cascade or Coast Range to the Shuswap Lakes, rain falls here in abundance, and a dense growth of timber covers the country eastward to the summit of the Rocky Mountains; hemlock, white pine, Douglass fir, spruce and some other varieties of timber growing to an enormous size. Cross-ties, bridge timber, telegraph poles and lumber can be obtained at any place between Kamloops Lake and the main range of the Rocky Mountains at small cost. For example: responsible parties propose to deliver at Savonas' Ferry bridge timber of all lengths at \$15 per thousand feet, B. M., cross-ties on the line at 25 cents each, and piles at four cents per lineal foot; and I think all such materials can be furnished at less cost.

From Sicamous Narrows to Griffin Lake, near the summit of Eagle Pass, in the Gold Range (thirty miles), the line follows the valley of the Eagle River. But little if any rock excavation occurs, and the earth work is very light. Some pile bridging, and a short pivot bridge at Sicamous Narrows will be required. The country is densely wooded, and clearing and grubbing will cost

about one thousand dollars per mile over the remaining portion of the line, east to the Rocky Mountains.

The Kamloops section (twenty-five miles), over which the line is definitely located and the work under contract, will cost, as before stated, one million one hundred thousand one hundred and forty-four (\$1,100,144) dollars. The section to Griffin Lake, at the summit of Eagle Pass (113 miles), is estimated to cost not more than an average of sixteen thousand six hundred (\$16,600) dollars per mile, making the average cost per mile from the west end of Kamloops Lake to Griffin Lake, a distance of 138 miles, twenty-one thousand five hundred and sixty-five (\$21,565) dollars per mile.

This estimate, I am satisfied, will cover the cost of this section of the road, including station buildings, water service, &c.

From Eagle Pass the line follows down the east slope of the Gold Range by way of the narrow valley of Tumwater Creek, to the west crossing of the Columbia River. The excavation is mostly in earth, but few rock cuttings occurring. As the Columbia is approached, some heavy embankments are required. The Columbia River is 800 feet wide, with a strong rapid current, and should be crossed by an iron truss bridge, with a timber trestle approach, 2,800 feet long, averaging thirty to thirty-five feet in height. The cost of this bridge can be reduced materially by using two per cent. grades on the east slope of the Gold Range, but as no grade exceeding sixty-six feet per mile occurs between the Selkirk Range and the Pacific coast, as before stated, it is best not to change here.

Eastward from the west crossing of the Columbia River, the line follows the valley of the Illicilliwaet, to the summit of the Selkirk Range (Roger's Pass); thence down the valley of the Beaver to the East Columbia, thence up the Columbia River Valley to the mouth of the

Kicking Horse River, and up that stream to the summit of the main range of the Rocky Mountains.

The line over the Selkirk Mountains, a distance of sixty-three miles, is remarkably easy to construct, there being comparatively little rock excavation, and but one short tunnel. The great bulk of the work will be in earth and loose rock. Two truss bridges of one span each will be required at the crossings of the Illicilliwaet and the Beaver, and one or two short truss bridges across small mountain streams, and a moderate number of short pile and trestle bridges across gullies on the mountain slopes.

At the east crossing of the Columbia a deck truss bridge, 350 feet in length, will be required. In the valley of the Columbia, for a distance of thirty-five miles, with the exception of the canyon (four miles), where there are two short tunnels and some heavy work, now being done, the line is a remarkably easy one to build, the work being mostly in gravel and sand, and the rock, where it occurs, consisting of slate and shale.

From the mouth of the Kicking Horse River to the summit of the Rocky Mountains, a distance of forty-four miles, the grading is nearly completed, and I can see no reason why the track cannot be laid to the mouth of the Beaver (seventy-nine miles from the Rocky Mountain summit) before winter sets in.

While traversing the line remaining to be built through the wooded section, evidences of snow slides were seen at and near Roger's Pass in the Selkirk Range, also near the summit of the main range of the Rocky Mountains, but the aggregate distance on which these occur does not exceed fifteen miles. A number of snow sheds will probably be required for the protection of the track, but nearly fifty miles of these are in successful use on the Central Pacific Road.

From careful inspection of the country through which the line passes, and an examination of the plans and profiles so far as the line is finally located, between the summit of the Gold Range and the summit of the Rocky Mountains, one hundred and fifty miles, I am satisfied that this section of the road can be constructed at an average cost not exceeding thirty-three thousand dollars (\$33,000) per mile, including station buildings, etc.

In view of the rugged mountain country, through which the line passes, from Savonas' Ferry to the summit of the main range of the Rocky Mountains, a distance of two hundred and ninety miles, and the dense timber obstructing the successful exploration of the country over most of the distance, you have an exceedingly cheap line to build, costing far less per mile than the mountain work of the Union and Central Pacific Roads.

The alignment is good, and the gradients, with the exception of the west slope of the Rocky Mountains, and over the Selkirk Range, in no place on the mountain section exceed sixty-six feet per mile.

On a portion of the West slope of the Rocky Mountains, and parts of both slopes of the Selkirk Range, grades of one hundred and sixteen feet per mile exist, but they occur within a comparatively short distance and can be easily and economically operated by the use of special locomotives, such as are used on similar gradients elsewhere.

I gave some attention to the nine miles of temporary track that has been built around a tunnel, and some heavy work in the vicinity of Mount Stephen, for the purpose of saving a year's time in completing the road through to the Pacific. This part of the road has four per cent. grades, and curves of ten degrees. As far as I examined this temporary line, I found it thoroughly built, with seventy pound rails (per yard), and first-class fastenings. It will answer

all purposes for traffic for years to come, without material increase in the cost of operating. The Atchison, Topeka & Santa Fe, and other roads crossing the Rocky Mountains have grades equal to or exceeding this one.

I also examined the section of the proposed permanent line around which the temporary line has been built, and especially, as you requested, the large rock slide immediately east of the long tunnel through a spur of Mount Stephen. All of the slide, except about one hundred and fifty feet in width, seems to have been formed from gradual accretions, as the face of the solid rock forming the cliffs south of the line has weathered and worn away. There is no evidence of any recent movement that could not be guarded against. Bushes of various kinds grow on the old and gradually accreted portion. The one hundred and fifty feet of this slide, above referred to, is the track of a small stream that comes out from under a glacier about one thousand feet above the grade line. This glacier extends up Mount Stephen nearly, or quite to the summit, the upper portion being hidden from view by a projecting spur of the mountain. This small stream is gradually accumulating debris from the glacier, and in times of extreme summer heat when the largest amount of snow and ice is being melted, a flood of water rushes down this slide, carrying with it the accumulated debris, into the valley below, with great force. A truss bridge one hundred and fifty feet in length, can be built over this slide through which these accumulations can be passed with safety.

But the temporary line around this place is so well built, and promises to answer present purposes so well, I should think it unwise to expend any money on the intended permanent line until the traffic really demands it.

From the summit of the Rocky Mountains, I went by

rail to Winnipeg, and had an opportunity to see the entire line by daylight.

The track is in most excellent condition. Many of the temporary bridges across the larger streams have been replaced by substantial masonry and iron structures, and others of this description are now being erected.

The country through which the road passes appears to be rapidly filling up with a farming population, and evidences of thrift and prosperity are seen in all settled parts. This country yields abundantly wheat, oats, barley, rye, potatoes, etc., and will soon become the great wheat-growing country of America.

I know of no country in the United States of the same area that equals this for the growth of wheat and other grains adapted to the climate. By comparison of samples taken from fields of standing grain, ready for the harvest, six hundred and eight hundred miles west of Winnipeg, with like samples from the Red River country in Minnesota, the merit was largely in favor of the former, and, judging from appearances, the yield will be much greater.

(Signed,) S. B. REED, C.E.

W. C. VAN HORNE, Esq.,

Vice-President, Canadian Pacific Railway,
Montreal.

The following telegram from Mr. Andrew Onderdonk, contractor for the Government Section of the Canadian Pacific Railway in British Columbia, will be of interest in connection with the foregoing reports.

SAVONAS' FERRY, B.C.,

August 15th, 1884.

GEORGE STEPHEN, Esq.,

President, C. P. R.,

Montreal.

Van Horne started through Eagle Pass this morning. I examined line with him nearly one hundred miles east of Kamloops. You will be glad to hear that the engineers have found a most remarkably easy line that will reduce cost on above distance over two millions from what we supposed last winter. The grades and alignment are easy, and the character of the work the cheapest mountain work I have ever seen.

(Signed,)

A. ONDERDONK.

Onderdonk,
e Canadian
of interest

B.C.,
5th, 1884.

I examined
You will be
ably easy line
rom what we
and the char-
een.

DERDONK.